

DISCUSSION OF THE AMENDMENT

Claims 1-2, 4-13, 15-16, 18-19 and 26-28 are active in the present application.

Claims 3, 14, 17 and 20-25 are canceled claims. Claims 26-28 are new claims. Support for the new claims is found in the specification in paragraphs [0011]-[0012] on pages 6-8 of the original specification. Independent Claims 1, 6 and 7 are amended herein to further define the silica glass crucible. Support for new amendment is found throughout the specification and original claims. Claims 1, 6 and 7 are amended to include the limitations of previously pending Claims 21, 22 and 23, respectively. The grooves recited in Claims 1, 6 and 7 now have upper and lower thresholds for length and width.

No new matter is believed to have been added by this amendment.

REMARKS

The independent claims now recite certain structural features of the silica glass crucible. For example, the crucible must have inner and outer walls with the outer walls adhered to a graphite susceptor. The graphite susceptor has a sliding frictional coefficient of more than 0.6 with respect to the outer wall of the crucible at 1500°C.

None of the prior art of record discloses a silica glass crucible adhered to a graphite susceptor and having a sliding frictional coefficient of the outer surface of the crucible to the graphite susceptor at 1500°C of more than 0.6. Such a sliding frictional coefficient is not inherent to a silica glass crucibles that is adhered to a graphite susceptor. For example, the original specification discloses inventive and comparative examples in Table 1 and on pages 9 and 10. The comparative crucible, i.e., a crucible that did not have the fines grooves of the presently claimed invention, was unable to provide the sliding fictional coefficient that of a crucible having the fine grooves of the claimed invention.

The presently claimed invention is therefore patentable at least because the claimed crucible has certain physical properties such as sliding coefficient of friction that are not inherent to crucible/graphite susceptor combinations.

The Office is of the opinion that the silica glass crucibles of previously presented Claims 21-23 are obvious in view of a combination of Segawa (US2002/0078886) and Tsuji (US 6,524,668) because it would be obvious to use the silica/carbon structure of the crucible disclosed in Tsuji in the jig of Segawa.

To begin with, a jig is not a crucible. Applicants submit that those of ordinary skill in the art readily recognize that a jig is different from a crucible. It is readily evident that a jig is a device for holding or manipulating an article inside a reaction chamber such as a chemical vapor deposition reaction chamber. Such a definition is in accord with the description of jigs as it is provided in Segawa (see paragraph [0002] of Segawa).

This is also in agreement with the accepted definition of the term “jig” (bold added):

jig [ENG] A machine for dyeing piece goods by moving by moving the cloth at full width (open width) through the dye liquor on rollers. [MECH ENG] **A device used to position and hold parts for machining operations and to guide the cutting tool.** [MIN ENG] A vibrating device in which coal is cleaned and ore is concentrated in water.

See page 1071 of the McGraw-Hill Dictionary of Scientific and Technical Terms, 5th ed., (1994), a copy of which is attached.

Applicants further draw the Office’s attention to the U.S. PTO class schedule and definitions used by the U.S. Patent and Trademark Office for classifying inventions. In several instances the Office uses the word “jig” to describe or classify inventions. In each of these classes, including Classes 408, 606 and 269, a jig is an article for holding an object that is undergoing machining or is otherwise being worked on. In no case does the Office use the term “jig” to define a crucible or any crucible-like article. A copy of the U.S. PTO schedule for different classifications that use the term “jig” was downloaded from the USPTO website on May 24, 2007 and is attached herewith.

Applicants submit that the information described above, including (1) publications describing jigs used in the semiconductor industry, (2) the Office’s use of the term jig in classifying and defining inventions, and (3) the ordinary definition of jig, proves that those of ordinary skill in the art would recognize that a jig is not a crucible.

The Office appears to be of the belief that those of ordinary skill in the art would use the (glass inner layer)/(carbonaceous material outer layer) structure of Tsuji as inspiration or direction to make the jig of Segawa. However, the Office failed to explain why it would be obvious to use a glass/carbon structure in the silica glass jig of Segawa. The Office makes the leap from the glass/carbon crucible of Tsuji to the silica glass jig of Segawa without

providing any explanation, reasoned technical argument, or objective evidence that one of ordinary skill in the art would find the disclosure of Tsuji relevant to the jig of Segawa.

Moreover, using the quartz/carbonaceous material structure disclosed in Tsuji to make the jig of Segawa would render the Segawa jig unsuitable for its intended purpose. It is readily evident from the disclosure of Segawa that the prior art silica glass jig must be effective at reducing contamination that occurs during semiconductor manufacturing processes. See paragraphs [0004]-[0006] on page 1 of Segawa, portions of which are reproduced below for convenience (underlining added):

... by treating a mechanically roughened silica glass jig with a specific aqueous solution a silica glass jig, wherein microcracks are released and there is no entering of decontaminates is obtained...

An object of the invention is to provide a silica glass jig for the semiconductor industry, which causes less peeling off of coated film, does not generate impurities contaminating semiconductor elements at the use thereof, and can reduce the washing times of jig, as well as causes less formation of cracks and shows a prolonged usable life and does not cause cracks.

Thus, the jig of Segawa is one that is used, e.g., inside a chemical vapor deposition reaction chamber, to reduce the likelihood of the occurrence of contamination.

Applicants submit that the use of a jig having a silica/carbon or quartz/carbon structure would be contrary to the objects of the invention disclosed in Segawa (i.e., the Segawa jig). It is readily recognized that carbonaceous materials such as graphite are effective adsorbents and/or absorbents. Using a carbon based material inside a chemical vapor deposition reaction chamber would result in the absorption of gaseous materials present, e.g., during the use of the jig when manufacturing semiconductor articles. This would make it substantially more difficult to control the semiconductor process and any later out-gassing from the carbon would contaminate the process.

Using a jig having a silica-carbon structure would cause problems in a semiconductor manufacturing process that are contrary to the expressed purpose and object of the Segawa disclosure. Modifying Segawa by including the glass/carbon structure of Tsuji would render the Segawa jig unsuitable for its intended purpose. In this regard, Applicants draw the Office's attention to MPEP § 2143.01(V). The Office's policy with regard to the combination of references wherein a combination of references would render the prior art unsuitable for its intended purpose is clear:

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification (citation omitted).

Here, the prior art invention being modified is the jig of Segawa. The intended purpose of the prior art jig is to hold a semiconductor article inside a reaction chamber such as a chemical vapor deposition reaction chamber. Including a layer of a carbonaceous material on the jig of Segawa would render it unsuitable for use in a chemical vapor deposition reaction chamber because the carbon would absorb process gases and/or impurities thus interfering with the process.

Applicants thus submit that the presently claimed crucible is not obvious in view of the jig of Segawa.

Applicants further submit that it would make no sense to modify the prior art jig of Tsuji to include a layer of carbonaceous material. To do so would render the jigs susceptible to decontamination by absorbing processing gases and contaminants and thereby render a quartz/carbon jig unsuitable for its intended purpose. Thus the combination of Segawa and Tsuji to render the claimed invention obvious is not supportable and should be withdrawn.

Applicants draw the Office's attention to new dependent Claims 26-28 which require that the fine grooves are present only on the outer surface of the silica glass crucible. The jig

of Segawa is made by immersing the prior art article in a bath that contains HF (see paragraphs [0015], [0020], [0016], and [0021]). The method for treating the prior art article necessarily treats all surfaces (i.e., inner and outer surfaces) because the prior art article is immersed in HF. The new claims exclude such an embodiment because the fine grooves are present only on the inner surface. Thus, the newly added dependent claims are further patentable over the cited prior art.

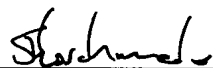
Applicants submit that the presently claimed invention is patentable for the reasons discussed above in detail and respectfully request the mailing of a Notice of Allowance.

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